UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/533,014	04/28/2005	Thomas Bosselmann	2002P12570W0US	1667

28524 7590 07/14/2006

SIEMENS CORPORATION
INTELLECTUAL PROPERTY DEPARTMENT
170 WOOD AVENUE SOUTH
ISELIN, NJ 08830

EXAMINER	
VALONE, THOMAS F	
ART UNIT	**PAPER NUMBER**
2858	

DATE MAILED: 07/14/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/533,014	BOSSELMANN ET AL.	
	Examiner	Art Unit	
	Thomas F. Valone	2858	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *27 April 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *21-40* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *21-40* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *28 April 2005* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Drawings

1. The drawings are objected to under 37 CFR 1.83(a) because they fail to show rotor blades "grounded via the rotor shaft" and the guide blades "grounded via the housing" as described in the specification (p. 10, line 1-2). Therefore, the "plurality of rotor blades ...electrically connected to a reference potential" (claim 21 lines 2-4) and the "plurality of fixed guide vanes... electrically connected to a reference potential" (claim 21, lines 4-6) must be shown or the feature(s) canceled from the claim(s). The electrical connection to a reference potential is missing. No new matter should be entered. It is suggested that two grounding symbols (earth ground or chassis ground style) need to be drawn in, one connected to the housing 2 and another connected to the rotor shaft 3. Any structural detail that is essential for a proper understanding of the disclosed invention should be shown in the drawing. MPEP § 608.02(d). Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the

remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claims 21 and 32 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The amended claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

The first charge distribution resulting in the first charge distribution generating a first emission in the kilohertz frequency range lower than a second emission generated in a gigahertz frequency range by a second charge distribution resulting from tribo-charging is not shown nor described in a physically convincing manner. Instead, Figures 7 – 9 show a uniform frequency distribution, as opposed to the amended frequency band separation for the two groups of claimed emissions. Furthermore, in view of the specification (p. 2, par. 6) and the applicant's summary of Harrold, the comparison of

electrostrictive versus tribo-charging effects misquotes him with the phrase, "typically in the GHz range" (p. 2, par 6) that is not found in Harrold at all. Instead, the evidence presented makes it more likely that Harrold's teachings are correct: that piezoelectric, electrostrictive, and tribo-charging effects together encompass a broad range of frequencies.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. Claims 21, 32, and 34 are rejected under 35 U.S.C. 102(e) as being anticipated by Harrold of record (US 6,512,379).

6. Regarding claim 21, Harrold includes a plurality of turbine rotor blades and vanes (18, Fig. 2) made of an electrically conducting material (col. 4, lines 34-35) having an electrically insulating surface (col. 4, lines 36-37) and arranged on a rotor shaft (20) that is rotatably mounted in a housing and electrically connected to a reference potential or a plurality of fixed guide vanes (22, Fig. 2) made of an electrically conducting material (col. 4, lines 34-35) having an electrically insulating surface (col. 4, lines 36-37) with the electrically conducting material of the guide vanes electrically connected to the reference potential (col. 5, lines 32-40), as in claim 21. Harrold also includes a

measuring element (28, Fig. 2) operating in a kilohertz frequency range for measuring an electric and/or magnetic field strength set up by a first charge distribution on the surface of the rotor blades or guide vanes (col. 6, lines 34-40) resulting from charged particles being deposited on the surface by an ionized gas flowing over the surface, the first charge distribution generating a first emission in the kilohertz frequency range lower than a second emission generated in a gigahertz frequency range by a second charge distribution resulting from tribo-charging so that a processing requirement for measuring the first emission resulting from the deposited charged particles is less than a processing requirement for measuring the second emission resulting for tribo-charging, and also placed near (adjacent to and in the region of) the blades or vanes (col. 4, lines 56-57), as in claim 21. Harrold also teaches a first (electrostrictive, col. 5, line 34) and second (tribo-charging, col. 5, line 38) charge distribution that cause different radio frequency signals as the applicant does, only one of which is due to tribo-charging (col. 5, line 33-40).

Most importantly, Harrold teaches "the radio frequency signals produced by the coating will likely encompass a broad range of frequencies from below radio frequencies to microwaves and beyond, and any subset of these frequencies may be selected for analysis" (col. 5, line 53-57). Furthermore, Harrold also teaches the resonant frequency in the kilohertz range (col. 5, line 10), which is comparable to the applicant's 4800 Hz spike in the drawings (Fig. 7 – 9), as due to the rotation speed of each blade. This is the same frequency range that both inventions concentrate upon for analysis. Lastly, Harrold clearly demonstrates in Fig. 5 a time domain signal that necessarily has to be in

the kilohertz range (applicant admission, p. 3, par. 9), "as each blade 18 passes the vane 22 adjacent to antenna 28, the antenna 28 will detect the second radio frequency signal from the vane, and the third radio frequency signal 42 from the blade" (col. 6, line 20), which is clearly seen in Fig. 5, implying a frequency matching the rotation speed (kHz).

Regarding claim 32, Harrold teaches a method for determining damage to an electrically insulating surface of a turbine component (col. 6, lines 25-26, 34-37), providing a plurality of turbine blades or vanes made of an electrically conducting material (col. 4, lines 34-35) and arranged within a turbo engine (Figs. 1 and 2); creating an electric and/or magnetic field strength by a charge distribution on the surface of the turbine blade or vane (tribo-charging causing static electricity on blades or vanes, col. 5, lines 37-38); measuring the electric and/or magnetic field strength by a measuring element (col. 5, lines 1-15); and determining a deviation from a definable threshold value (other radio signals, col. 6, line 28). The same argument as above applies to the amended limitations in claim 32 drawn toward kilohertz frequency range measurement.

Regarding the "processing requirement" or "processing technique" in claims 21 and 32 respectively, for measuring the first charge distribution versus the second charge distribution is an FFT transformation unit, as described in the specification (p. 7, par. 25). The processing requirement and technique of instrumentation for different frequency ranges, whether kilohertz or gigahertz, is actually the same, as is known to one skilled in the art to which this invention pertains. An oscilloscope or spectrum

analyzer today, for example, includes processing capability from the kilohertz range well into the gigahertz range.

Regarding claim 34, at least one of the measuring elements of Harrold are connected to a measuring (col. 5, lines 8-15) and monitoring unit (col. 6, lines 36-7 and Fig. 3) connected to a control center (computer 36, col. 5, line 14).

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. Claims 22 and 33, 23-28, 30 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Harrold in view of Khorrami (US 5,970,393).

Regarding claims 22 and 33, the teachings of Harrold are reviewed above which also suggest that a separate antenna may be placed in the region of each vane (col. 6, line 36).

Harrold does not describe the attachment of his measuring element to or on the rotor shaft.

Khorrami teaches the use of a measuring element (microstrip antenna) which can be imbedded and flush mounted or arranged onto high speed machinery, which obviously includes rotating objects (col. 3, lines 11-30) for the monitoring of turbine blades (col. 3, line 60), which satisfies the passive, wireless capability that is implied by

the claim's arrangement on a moving object as a rotor shaft, as best understood in light of the specification and #9 in Fig. 5 of the instant application.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have utilized the microstrip antenna of Khorrami for a measuring element arranged on high speed machinery, such as a rotor shaft in the region of the vanes, as suggested by Harrold (col. 6, lines 35-36), for the benefit of continuous monitoring of the condition of the vanes with the measuring element that is relatively inexpensive and light weight (Khorrami, col. 3, lines 11-13).

Regarding claims 23 and 30, Harrold uses an insulating coating (col. 4, lines 36-37) on the electrically conductive blades and vanes, as in claim 30. Harrold's electrically conductive blades and vanes are capable of producing a charge distribution (col. 5, lines 39-40) on the surface of the blades (static electricity within the coating 26), as in claim 23, which is generated by the electrostrictive and piezoelectric insulating properties of the coating.

Regarding claim 24, Harrold uses a coaxial antenna where the axis is a ferrite rod and the outer coaxial layer is nickel (col. 5, lines 2-4).

Regarding claims 25 – 27, at least one of the measuring elements of Harrold are connected to a measuring (col. 5, lines 8-15) and monitoring unit (col. 6, lines 36-7 and Fig. 3) connected to a control center (computer 36, col. 5, line 14).

Regarding claim 28, Harrold's measuring, monitoring and control center inherently comprises a signaling device (col. 6, lines 48-53).

Regarding claim 31, Harrold's turbine engine is a gas turbine as well (col. 5, lines 16 and 36).

9. Claim 29 is rejected under 35 U.S.C. 103(a) as being unpatentable over Harrold as modified by Khorrami as applied to claim 26, and further in view of Deegan of record (US 5,552,711).

The teachings of Harrold as modified by Khorrami are reviewed above.

Harrold as modified by Khorrami does not include the aspect of an engine shut down by the monitoring unit when a threshold value is exceeded.

Harrold as modified by Khorrami does not disclose turbo engine shut down by the monitoring unit.

Deegan, from the same field of specialty, teaches the shutting down of the turbine engine by the monitoring unit (Fig. 1A) when a definable threshold value is exceeded (col. 4, lines 12-14), as in claim 29.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have included Deegan's teachings of shut down by the monitoring unit in the invention of Harrold, as modified by Khorrami, for the benefit of preventing catastrophic failure of the turbine engine when a threshold value is exceeded.

10. Claims 35 and 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Harrold in view of Deegan of record.

The teachings of Harrold are reviewed above.

Harrold does not include the aspect of an alarm output or engine shut down when a threshold value is exceeded.

Deegan, from the same field of specialty, teaches the shutting down of the turbine engine by the monitoring unit (Fig. 1A) when a definable threshold value is exceeded (col. 4, lines 12-14), as in claim 36, and also the concept of registering an alert (col. 3, line 22), which is inherently an alarm, as in claim 35.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have included Deegan's teachings of shut down and alarm in the invention of Harrold for the benefit of preventing catastrophic failure of the turbine engine when a threshold value is exceeded.

11. Claims 37 - 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Harrold in view of Deegan and IEEE Interharmonic Task Force.

The teachings of Harrold are reviewed above.

Harrold does not include a signal transformation by a Fourier transform (FFT) where it is displayed and/or signaled and compared with a definable threshold value.

Deegan, from the same field of endeavor, teaches the use of a measurement signal processor which performs a spectrum analysis transformation with the product of this analysis passed onto a display device (col. 3, lines 19-20), as in claim 39, and compared to a definable threshold value (predetermined level, col. 4, line 14), as in claim 40.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have included Deegan's display and comparison with a definable

threshold value in Harrold's invention for the benefit of expedient response to the turbine engine requiring service.

Harrold as modified by Deegan does not explicitly address a Fourier transformation (FFT), though it is inherent to spectrum analysis.

The IEEE Interharmonic Task Force, which refers to its work with turbine engines (p. 3, 2nd col., line 21) does include spectrum analysis (Figure 5) and the connection between such analysis and the Fast Fourier Transformation (p. 5, 2nd col., par. 4), as in claims 37 and 38.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have included FFT spectrum analysis, as taught by Deegan and the IEEE Interharmonic Task Force, of the signal from a measuring element of Harrold, for the benefit of preventing catastrophic failure by filtering a specific frequency and setting an alarm when that frequency component exceeds a predetermined threshold value.

Response to Arguments

12. Applicant's arguments filed 4/27/06 have been fully considered but they are not persuasive.

Applicant argues that ionized gas flowing over a surface will produce kilohertz frequencies and that tribo-charging generating emissions are "believed" to occur at higher frequencies, in addition to the processing requirement for measuring the first emission being less than the processing requirement for measuring the second emission.

In response to applicant's argument (p. 8, line 8) that tribo-charging generating emissions are believed to occur at higher frequencies, the examiner respectfully disagrees. Harrold notes two effects that cause radio frequency signals as the applicant does, only one of which is due to tribo-charging (col. 5, line 33-40). Most importantly, Harrold teaches "the radio frequency signals produced by the coating will likely encompass a broad range of frequencies from below radio frequencies to microwaves and beyond, and any subset of these frequencies may be selected for analysis" (col. 5, line 53-57), which includes lower frequency techniques. Furthermore, Harrold clearly demonstrates in Fig. 5 a time domain signal that necessarily has to be in the kilohertz range, with each blade producing a recognizable spike (e.g. "marking blade produces a first radio frequency signal 38," col. 6, line 2) and an example, in the kilohertz time domain, of a reduced amplitude signal, due to a blade with a deteriorating coating (42a, Fig. 5). This data would also be expected to include any ionized gas deposited charges as well. Instead of teaching away from measuring emissions using simpler, lower frequency techniques, Harrold conclusively teaches the lower frequency kilohertz method for determination of damage to a turbine component by the examples cited above. To summarize, Harrold proves that (1) he makes critical, damage-determining measurements in the lower frequency kilohertz range, and (2) he determines precisely which blade's or vane's insulating surface is damaged by counting the signals due to each blade and vane (col. 6, line 30), starting from the marking blade, which is only possible in the lower frequency, kilohertz time domain, as graphically shown in Figure 5 of Harrold.

Conclusion

13. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thomas F. Valone whose telephone number is 571-272-8896. The examiner can normally be reached 9 - 5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Diane Lee can be reached on 571-272-2399. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Thomas Valone, PhD, PE
Patent Examiner
Art Unit 2858
571-272-8896

DIANE LEE
SUPERVISORY PATENT EXAMINER